Canadian Association of Physicists

Association canadienne des physiciens et physiciennes

Contribution ID: **3373** Type: **Oral not-in-competition (Graduate Student) / Orale non-compétitive (Étudiant(e) du 2e ou 3e cycle)**

(G) Optical pumping of francium atoms for the measurement of the 7S-8S scalar to vector transition polarizability ratio.

Wednesday, 8 June 2022 14:00 (15 minutes)

Low-energy precision electro-weak physics tests are advocated as part of the search for physics beyond the Standard Model. We are working towards a measurement of atomic parity violation (APV) in francium, Fr (Z = 87), the heaviest alkali in a magneto-optical trap (MOT) online to ISAC at TRIUMF. The transition of interest in Fr is between the 7S and 8S states, where the parity violating (PV) observable will be the interference between a parity-conserving "Stark induced"E1 amplitude, created by applying a dc electric field to mix S and P states, and the vastly weaker PV amplitude. To explore the Stark amplitude, in particular the ratio of the scalar to vector transition polarizability, we need to know the population distribution of atoms in the magnetic sublevels, *m*, of the ground state. I will talk about our strategy for preparing the spin polarization of atomic states in Fr in a MOT which will also help in exploring the m-level dependence of the interference of E1 and our recently observed magnetic dipole M1 amplitude. Following our success in fast switching of the magnetic fields, I will discuss our plan for detection of spin-polarization using Raman techniques, and some improvements for our detection system. These developments will pave the path towards atomic parity violation in francium.
This work is supported by NSERC, NRC, TRIUMF, U Manitoba, U Maryland.

Primary author: SHARMA, Anima

Co-authors: HUCKO, Timothy (University of Manitoba); Prof. GWINNER, Gerald (University of Manitoba); GORELOV, Alexandre (TRIUMF); TEIGELHOEFER, Andrea (TRIUMF); AUBIN, Seth (William and Marry); GOMEZ, Eduardo (Universidad Autónoma de San Luis Potosí); OROZCO, Luis (University of Maryland); BEHR, John (TRIUMF); RANJAN KALITA, Mukut (TRIUMF); Dr PEARSON, Matt (Triumf)

Presenter: SHARMA, Anima

Session Classification: W2-4 Fundamental Symmetries and new physics at low energy II (DNP) | Symétries fondamentales et nouvelle physique à basse énergie II (DPN)

Track Classification: Technical Sessions / Sessions techniques: Nuclear Physics / Physique nucléaire (DNP-DPN)